Daffodil International University (DIU)
Department of Electrical and Electronic Engineering

EEE 422: Measurement and Instrumentation Lab

EXPERIMENT NO: 07

NAME OF THE EXPERIMENT: PRECISION RECTIFIERS IN SIGNAL PROCESSING

Objective:
To study full-wave precision rectifiers for signal processing and measurement purposes.

Theory:
To measure an ac voltage precisely, a precision rectifier should be used to get full wave rectification of the input signal. After filtering out the higher harmonics using a low-pass filter, this rectified signal could be interlaced to a digital voltmeter chip for displaying the value of the input ac signal.

The circuit under consideration uses equal resistors and has an input resistance equal to 2.2k. For positive half cycle, the D1 diode conducts; input current divides in two paths and the second op-amp act as an inverter. The output voltage is therefore positive for both cycles giving the absolute value of the input signal in rectified form.
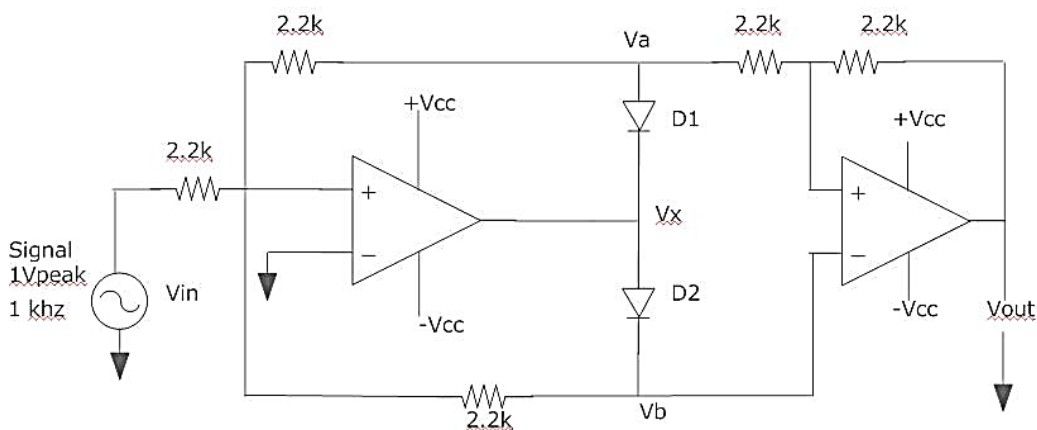
Circuit Diagram:

Fig. 1: Precision full wave rectification

Positive half cycle: Vx = -ve, Va = Vb = +ve, D1 diode conducts, current is divided at Va. So, second op-amp is in non-inverting mode.

Negative half cycle: Vx = +ve, Va = Vb = -ve, D2 diode conducts, current is added at Vb. So second op-amp is in non-inverting mode. Feedback: $R_{in}= R_{out} = 2.2k$; gain feedback (like buffer), just compensates the input

List of Equipment:

1. IC741 2pcs
2. Resistors 2.2k-5 pcs
3. Diode 2pcs
4. Trainer board
5. Oscilloscope
6. Signal generator

Procedure:

1. Connect the circuit as shown in the figure. Take +ve Vcc and –Vcc +20V and - 20V respectively.
2. Adjust the signal generator.
3. Record the voltage wave forms at V_{in} , V_a, V_b, V_x and V_{out}

Report:

1. Draw the voltage wave form at V_{in}, V_a, V_b, V_x and V_{out}
2. Explain the working principle of the experimental circuit.